of George H. Darwin, "On the Influence of Geological Changes on the Earth's Axis of Rotation" (*Proc. Royal Soc.*, Vol. 25, 1876–77, pp. 328–332). Köppen reports at length a paper by G. V. Schiaparelli (1889), which, so far as I can judge from his account, is merely an elaboration of a part of Darwin's work. His argument is this, that though the axis of rotation of a rigid earth could not depart more than a few degrees from its axis of figure, as a result of any possible geological changes, the axis of a plastic earth could be changed indefinitely under a continuing cause. You will find that in Darwin. But where is the cause? It is easy to see from Darwin's calculations that if the North American continent were floated off from Europe to a distance of 90° to the west, the displacement of the pole would be only a few minutes of arc; which would, moreover, be partially counteracted by the simultaneous drift of South America. Such changes cannot occur repeatedly. What geological changes can be imagined that will continue to move the pole *in the same direction* through 65°? Our authors suggest none.

The hypothesis of the movements of the pole and the drift of the continents was adopted to fit certain facts, such as the reciprocal outlines of South America and Africa, the principal location of Permian glaciation, etc.; but, as has been shown, it does not fit other facts. As a further instance, the position of the north pole in Eocene time was placed about as far from Alaska as it now is, but on the other side. We should therefore expect a cold climate in Alaska during the Eocene; but this is just the time that the climate there was warmest, as far as we know. Our authors rely on many of the older estimates of geological temperatures, which require modifications in the light of later studies.

There have been many attempts to deduce the characteristics of the earth from a hypothesis; but they have all failed. There is the pentagonal system of Élie de Beaumont, the tetradedral system of Green; and others might be mentioned. This is another of the same type. Science has developed by the painstaking comparison of observations and, through close induction, by taking one short step backwards to their cause; not by first guessing at the cause and then deducing the phenomena.

HARRY FIELDING REID

WALL ATLAS OF COMMERCIAL GEOGRAPHY

GEORGE PHILIP. **Philips' Comparative Wall Atlas of Commercial Development.** A set of eight maps, size 42 by 34 inches: (1) World, 1: 40,000,000; (2) Europe, 1: 6,000,000; (3) Asia, 1: 12,000,000; (4) Africa, 1: 9,000,000; (5) North America, 1: 9,000,000; (6) South America, 1: 9,000,000; (7) Australasia, 1: 6,000,000; (8) British Isles, 1: 1,000,000. George Philip & Son, Ltd., London, [1922.] 3s. 6d. each, unmounted.

Geography as an interpretative science is greatly indebted to the house of Philip. They gave us a few years ago an invaluable set of maps, the "Comparative Wall Atlas." In this set, for instance, the map of natural vegetation went beyond the miserable confusing designation that had been used so disappointingly before under the title of "woodland, grass, and cultivation." These maps are real geography in a visible, quickly understandable, and highly effective form.

The announcement of a new series was greatly anticipated by the reviewer, but he must confess to considerable disappointment. The purpose and method of construction of the present series of maps of commercial development were described and exhibited before the Royal Geographical Society some years ago (George Philip: A New Series of Economic Maps for School Use, *Geogr. Journ.*, Vol. 50, 1917, pp. 438–447). Mr. Philip then said: "How, then, within the limits imposed by the size to which a school atlas is restricted, and the number of maps which it can afford to devote to economic geography, can we prepare a really useful series of economic maps? After experimenting on various lines, I decided that the right method to adopt was to associate the distribution of the population with the nature of its economic activities. This conclusion meant in effect that the groundwork of the economic map should be formed by the combination of a map showing the density or distribution of the population and a map showing regional vegetation. Only by weaving together the materials supplied by these two maps did it seem possible to obtain the basis for a reliable representation of the progress achieved by man in his exploitation of the world and its resources, and of the general character of his various occupations."

The new series has appeared in the form of wall maps, but it may very properly be called an atlas also. One must walk up close to the maps to see what is on them. Some useful information of this sort is the table printed on a white patch in the blue ocean near each port showing its total exports and imports and several of the leading articles of both import and export arranged in order of importance. The maps are mines of information to be painfully studied at close range. The process indeed is painful because of the confusion that arises largely from the working out of the fundamental idea of "weaving together" the data of population distribution and vegetation. Thus one color is given for land (agricultural, pastoral, and forest) with one population density, and an entirely different color for the same sort of land with a different population density. The result of this is that the forests of Sweden and the almost grassless and quite treeless steppes east of the Volga appear in the same color. For undeveloped parts of the world some of the maps are much better; for example, regions of different kind of forest in Labrador, Canada, and Alaska are shown with great minuteness; the areas of virgin tropical forest come out quite clearly where there is no agriculture to confuse.

The sense of confusion is increased by the use of colors that vary from each other so little that the ordinary person has difficulty in carrying the distinction from the legend of the map. This seems almost inexcusable when one considers that the maps are quite likely to fade somewhat and, in the second place, that for years it has been customary to use a small figure to carry identification in cases of this sort. The world map of occupations is better than the continent maps because the attempt to weave together two different things has been abandoned; but here we still face the difficulty of color identification.

The makers of the series have fortunately taken the advice of the British Association and avoided the hopeless business of trying to show economic phenomena by writing words or letters on the maps. They have adopted instead seven or eight symbols in red to show iron, copper, tin, diamonds, gold, coal fields, petroleum. One of the interesting results of this method is to show on North America by the red hollow squares iron in eastern Tennessee, on the Virginia-Carolina boundary not far from Norfolk, at Butte, Mont., at Madison, Wis., but none at Chicago, Pittsburgh, or Buffalo.

The question of accuracy or up-to-dateness of information is brought slightly into question when one sees the designation "Regions Incapable of Development" (desert, tundra, Alpine, etc.) and observes that it is made to cover four-fifths of Alaska and those parts of Canada where Stefansson has described herds of caribou so large that they covered acres or even square miles and took days to pass, with total numbers which ran into the millions. Indeed these caribou herds are beyond doubt the greatest masses of meat animals to be found anywhere on the earth today.

The maps show at a glance by the size of the band in the ocean the value of commerce for certain routes, and here they are entirely different from all previous maps of this sort, which indicates that either the other maps are wrong or that this one is using war valuations; but there is no date to make us certain about this.

In the corner of the world map is an inset showing the means of communication, including beasts of burden; and ice-closed seas are also indicated—a valuable addition here and on the continent maps where it figures.

As it is, the reviewer expects to go back to Philip's earlier series and have his students use it in conjunction with Finch and Baker's "Atlas of World Agriculture" and the U. S. Geological Survey's "Atlas of Mineral Resources." If Messrs. Philip would simplify the maps of Commercial Development to some extent, he would probably wish to use them; but these good workers have fallen prey to the very natural impulse to overload that greatest of all printed pages, the map.

J. Russell Smith

Two British Textbooks of Geography

R. N. Rudmose Brown. **The Principles of Economic Geography.** xv and 208 pp.; bibliogr., index. Sir Isaac Pitman & Sons, Ltd., London, Melbourne, Toronto, New York, 1920. 8½ x 5½ inches.

O. J. R. Howarth. **A Commercial Geography of the World.** 2nd edit. 235 pp.; maps, diagrs., index. (The Oxford Geographies.) Clarendon Press, Oxford, 1920. $1.80. 7½ x 5 inches.

"Principles of Economic Geography" is a book of two hundred and eight pages, eighty thousand words, without a map, picture, graph, or diagram. It tries to cover everything